AIRBORNE INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE: MISSION COMMAND AND CENTRALIZED CONTROL

A Monograph

by

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This monograph examines the utility of implementing the mission command philosophy in airborne intelligence, surveillance, and reconnaissance (ISR) operations. This study begins by examining Helmuth Von Moltke's views on the exercise of disciplined initiative in battle. Brian Lawson's design problem model provides a framework for analyzing constraints as a source of friction. Confederate calvaryman J.E.B. Stuart's Gettysburg saga provides a vehicle for mission command analysis, given similiarities between Civil War cavarly reconnaissance and modern airborne ISR operations. This study also focuses on the pursuit of airborne reconnaissance support by World War I artillerymen, whose views on organic control echo current dialogue on UAS employment. This monograph concludes by assessing the potential impact of enhanced implementation of the mission command philosophy on theater airborne ISR effectiveness.

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ABSTRACT

AIRBORNE INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE: MISSION COMMAND AND CENTRALIZED CONTROL, by Lt Col Garry S. Floyd, 47 pages.

The United States Army is organizing, training, and equipping its divisions with medium-altitude unmanned aerial systems (UAS). These platforms are entering the battlespace just as operations in Afghanistan may be winding down, and just as the Air Force is gaining the ability to generate sixty-five global combat air patrols with heavily armed MQ-9 Reapers. There is risk that as the Army begins to rely more on organic medium altitude capabilities, the joint force will forget important lessons learned, and that integration of organic and theater ISR capabilities will suffer.

This monograph examines the utility of implementing the mission command philosophy in airborne intelligence, surveillance, and reconnaissance (ISR) operations. This study begins by examining Helmuth Von Moltke's views on the exercise of disciplined initiative in battle. Brian Lawson's design problem model provides a framework for analyzing constraints as a source of friction. Confederate calvaryman J.E.B. Stuart's Gettysburg saga provides a vehicle for mission command analysis, given similiarities between Civil War cavarly reconnaissance and modern airborne ISR operations. This monograph also highlights the experiences of World War I artillerymen and their pursuit of organic airborne reconnaissance support. The artillerymen echo current dialogue on UAS employment. This study concludes by assessing the impact of increased implementation of the mission command philosophy on theater airborne ISR effectiveness.

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TABLE OF CONTENTS

ACRONYMS

ADP	Army Doctrine Document
ADRP	Army Doctrine Reference Document
AFDD	Air Force Doctrine Document
AOC	Air Operations Center
ATO	Air Tasking Order
ATTP	Army Tactics, Techniques, and Procedures
BUB	Battle Update Brief
CAG	Commander's Action Group
CAP	Combat Air Patrol
CAOC	Combined Air Operations Center
COA	Course of Action
CONUS	Continental United States
CONOPS	Concept of Operations
EAD	Echelons Above Division
FM	Field Manual
FMV	Full Motion Video
GAO	United States Government Accountability Office
GMS	Ground Mission Supervisor
IED	Improvised Explosive Device
ISR	Intelligence, Surveillance, and Reconnaissance
JFACC	Joint Forces Air Component Commander
JFC	Joint Force Commander
JOPPA	Joint Operations Plan for Air
MTO	Mission Type Order
PED	Processing, Exploitation, and Dissemination
SAMS	School of Advanced Military Studies

SFC	Sergeant First Class
SIGINT	Signals Intelligence
SOF	Special Operations Forces
SNCO	Senior Non-Commissioned Officer
TOC	Tactical Operations Center
UAS	Unmanned Aerial Sensors
UAV	Unmanned Aerial Vehicle

ILLUSTRATIONS

Page

INTRODUCTION

> …It is believed that our Air Service has the tendency to indulge in combat rather than to perform the functions of reconnaissance and the adjustment of artillery fire.
>
> —Brigadier General D.E. Autman, 1919

> …Moments later, an Airman first class and a Private first class, separated by 12 time zones, exchange what they know about the potential ambush in real-time, and a wave of intelligence about the enemy's location begins to arrive.
>
> —Colonel Jason Brown, 2009

In September 2010, John David Blom, in his comprehensive *Unmanned Aerial Systems: A Historical Perspective,* captured the impact that Unmanned Aerial Sensor (UAS) aircraft and their operators have had on America's wars in Iraq and Afghanistan. Blom relates a story about how an Army UAS operator, employing a "Warrior" UAS, saved a convoy from an improvised explosive device (IED) attack:

> because it [the Warrior and its operators] was organic within the division, the operation team was in sync with the operations and activities of the ground forces that the vehicle supported…because the operator knew where the convoy was headed, he warned the convoy commander. The commander stopped his vehicles, the Warrior lased the target, and a team of Apache and Kiowa helicopters engaged both the IED and the insurgents.[1]

This may be the perfect UAS vignette, highlighting how airborne ISR operations saved lives by finding and fixing a threat while enabling a ground commander to finish the enemy. However, Blom then makes a direct and curious assertion that almost seems out of place. He writes that "an operator and analyst working from the Continental United States (CONUS) would have identified the Improvised Explosive Device (IED) being set and directed other units to destroy it, but the analyst might not have known to warn the approaching convoy and save U.S. soldiers lives."[2]

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[1] John David Blom, "Unmanned Aerial Systems: A Historical Perspective," *Occasional Paper 37, Combat Studies Institute Press, September 2010,* http://carl.army.mil/download/csipubs/OP37.pdf (accessed June 18, 2013), 109.

[2] Ibid.

Blom leaves this assertion unexplained and unsupported. Clearly, he is suggesting that CONUS-based UAS operators and analysts employing a sensor with basically the same capabilities as an analyst deployed forward with ground forces would not have been equal to the task. The mission construct that Blom is describing is representative of how the United States Air Force organizes, trains, and equips airborne ISR capabilities. The ISR sensors are carried on aircraft deployed to the theater, such as the U-2 Dragonfly, RQ-4 Global Hawk, and MQ-9 Reaper. The Airmen who process, exploit, and disseminate the intelligence those platforms, from locations that are usually CONUS-based, are generally far removed, at least geographically, from the ground forces they support. Therefore, by asserting that a CONUS-based analyst would have failed to inform the convoy about the IED, Blom is suggesting that more work needs to be done towards bridging the gap between CONUS-based airmen and the ground forces they support.

Military commanders are always in pursuit of information upon which to base their decisions. In *Command in War,* Martin Van Creveld describes the history of command as an "endless quest for certainty," and an eternal "race between the demand for information and the ability of command systems to meet it."[3] In every era, there is a system in place designed to move information to and from the commander. This includes intelligence, which Clausewitz defined broadly as "every sort of information about the enemy."[4] Commanders in every war want to know what threats might be lurking on the other side of the hill or otherwise beyond their line of sight, so the issue is whether the intelligence gathering system is capable of collecting, analyzing, and reporting information back to the headquarters in time to make a difference.

For the United States Army, mission command refers not only to systems for moving

[3] Martin van Creveld, *Command in War* (Cambridge, MA: Harvard University Press, 1985), 264-265.

[4] Carl von Clausewitz, *On War* (Princeton, New Jersey: Princeton University Press, 1984), 117.

information but also to a broader command philosophy. Does the mission command philosophy present an answer to the question raised by Blom? What impact would implementation of the mission command philosophy have on the conduct of theater airborne Intelligence, Surveillance, and Reconnaissance (ISR) operations? This is a critical question, not simply because military operations continue in Afghanistan, but because the nature of those operations will change as Afghans assume more responsibility for their nation's security. Absent the forcing function of war, the air and land components may grow further apart on UAS employment and integration in the joint battlespace. This could prove costly at the outset of the next major regional conflict. Understanding how airmen and soldiers can apply mission command in airborne ISR operations, and the potential impact of doing so, must begin by establishing a framework for analysis followed by exploration of fundamental mission command concepts. This monograph will begin with an introduction of Brian Lawson's model for design problems. Lawson's model provides a guide for understanding system constraints as a source of friction between airmen conducting ISR operations and the ground forces they support. The mission command philosophy has its roots in the theories and practices of Helmuth von Moltke, the Elder. Moltke captured the essence of what has since become known as *auftragstaktik,* which the United States Army has distilled further into the mission command philosophy. This monograph explores how Moltke's demand for disciplined initiative is relevant to airborne reconnaissance operations.

During Moltke's tenure as Chief of the Prussian General Staff in the latter half of the 19th century, horse cavalry played a major role in the commander's system for gathering intelligence. Horse cavalry was a flexible force capable of a wide range of missions. When performing in a reconnaissance role, the cavalry served as the commander's eyes and ears, and its mission was to rapidly find, analyze, and report the enemy's composition, disposition, and if possible, intentions back to the headquarters as quickly and accurately as possible. There are interesting parallels

between horse cavalry reconnaissance and modern airborne ISR operations.

When Moltke was leading the Prussian Army to victories over Austria and France, recent technological advancements were beginning to change the nature of warfare. Horse cavalry was still a maneuver force, capable of conducting raids deep in the enemy's battlespace at unanticipated times and from unexpected directions. These were distributed operations, and in a way, cavalry commanders brought a broader perspective to the battlefield given their increased mobility. As Gordon Craig indicates in his seminal study of the battle of Koniggratz, Moltke came to believe that cavalry had less utility as a shock weapon employed in a mass charge at a decisive moment, but instead would have greater utility performing "reconnoiter, intelligence, communication, and pursuit" missions.[5] Modern UAS assets such as the MQ-9 Reaper bring this same type of flexibility throughout the depth of the battlespace. For the Reaper, the line between deep reconnaissance and deep strike operations is as seamless as it was for nineteenth century cavalry.

This monograph assesses the role mission command might play in theater airborne ISR operations by examining the actions of Confederate cavalryman James Ewell Brown (J.E.B) Stuart during the Gettysburg campaign. General Robert E. Lee and his famed cavalry commander practiced aspects of mission command in what was essentially a reconnaissance operation conducted with an independent, distributed force. Air Force ISR platforms comprise an increasingly distributed operations force, creating an operational environment in which practice of the mission command philosophy should thrive if properly applied. The Air Force's distributed operations construct creates challenges that are, in some ways, similar to those Stuart faced at Gettysburg. Indeed, Stuart's saga reveals much about the nature of mission command, and lessons

[5] Gordon A. Craig, *The Battle of Koniggratz: Prussia's Victory Over Austria, 1866* (Westport, CT: Greenwood Press Publishers, 1964), 176.

from Stuart's experience remain both relevant and applicable across warfighting domains.

Following the examination of Stuart's ride at Gettysburg, this monograph explores why World War I artillerymen pursued organic control of airborne reconnaissance after the war was over. World War I began just fifty years after Stuart's ride at Gettysburg, and from the outset, airmen fought for control of the skies over Europe. Commanders quickly recognized the inherent advantages of observing the battlefield from the air, yet those advantages proved difficult to grasp as friction, ever-present in war, quickly asserted itself in air-ground coordination efforts. Perhaps nowhere is that friction reflected more than in the efforts of artillerymen to leverage airpower for reconnaissance and artillery observation, which began in World War I and continued through World War II. Their quest for organic control of aerial reconnaissance helped give birth to U.S. Army aviation, and their arguments frame modern challenges associated with the joint integration of Army and Air Force manned and unmanned ISR assets. This monograph examines those arguments, which echo views soldiers still hold today, and concludes by revisiting the question of whether the mission command philosophy enhances theater airborne ISR effectiveness.

AIRBORNE ISR AND MISSION COMMAND: A DESIGN PROBLEM

In his book *How Designer's Think: The Design Process Demystified*, Bryan Lawson provides a useful framework for thinking about constraints and design solutions with broad applicability. Lawson first describes four groups that generate design constraints to include designers, clients, users, and legislators.[6] Designers employ creativity to solve problems. In Lawson's model, designers bring the most flexibility to the problem solving process.[7] Lawson

[6] Brian Lawson, *How Designers Think: The Design Process Demystified* (Oxford, UK; Elsevier, 2006), 90.

[7] Ibid., 90

defines clients as "someone in need who is unable to solve the problem, or perhaps, even fully to understand it without help."[8] In a military sense, the client is ultimately the political leadership that provides the objectives for military operations. Lawson draws a "distinction between clients who present problems" and the "ultimate users of the outcome."[9] In military design and planning, users are predominantly found at the tactical command echelons, such as battalions or squadrons attempting to carry out a specific tactical task. Legislators who create seemingly rigid constraints with which designers must contend is Lawson's final group of constraint generators.[10] Military planners can find themselves influenced by a broad array of rigid constraints whose sources might be thought of as legislators. The military service departments at the Pentagon, who navigate the defense budget process in order to organize, train, and equip their respective forces, stand out as legislators for ISR operations and planners.

In addition to defining the various generators, Lawson further describes constaints by domain and by function, which serves to complete his framework. The "domain of design constraints" describe whether a constraint results from internal or external influences on the design process.[11] The domain from which a constraint originates further illuminates the "required or desired relationships between various elements."[12] For the ISR planner, an external constraint might be the weather, while an internal constraint would be the number of sorties available from an aircraft. Lawson suggests "the essential significance of the domain of a constraint lies in the

[8] Ibid., 84.

[9] Ibid.

[10] Ibid. 89.

[11] Ibid., 92.

[12] Ibid.

freedom available to to the designer."[13] Lawson further asserts that internal constraints allow the designer, or the planner, more freedom since internal constraints "only govern factors which are under the designer's control."[14]

According to Lawson, functional constraints "ensure that the designed system or object performs the functions demanded of it as adequately as possible."[15] The four broad functional constraints offered by Lawson's model are radical, practical, formal, and symbolic constraints. Radical constraints "deal with the primary purpose of the object or system being designed."[16] Concerning ISR planning, a radical constraint might be a requirement that ISR planners dedicate an asset to a specific task at the exclusion of other tasks within the capabilities of the sensor. In such cases, shared understanding is critical, as the radical constraint may conflict with other priorities. Lawson's practical constraints encompass the "reality of producing, making, or building the design; the technological problem."[17] Practical constraints that emerge in ISR planning range from available sensor loiter time to technical capabilities. Another might be whether there are enough analysts available to process, exploit, and disseminate intelligence from an increasingly a vast array of sensors.

Formal constraints are "those to do with the visual organization of the object."[18] For architectural designers formal constraints might be about the look or feel of the object under design. In military terms, formal constraints can be thought of in terms of mission narrative as

[13] Ibid., 97.

[14] Ibid.

[15] Ibid., 100.

[16] Ibid., 103.

[17] Ibid., 103.

[18] Ibid., 104.

planners step back from their operational designs in order to ask themselves if their plan both meets the commander's intent and "appears" feasible given the operating environment. Symbolic constraints are the final functional area of design constraints and can also be thought of in terms of narrative. ISR planners may find themselves required to craft and execute a sub-optimal plan including assets provided by a coalition partner because the symbolic meaning of doing so supports some broader narrative that is important to political leaders.

The three dimensional sketch in Figure 1 is a representation of Lawson's model with a slight adaptation with regards to the four groups that generate design constraints. The application

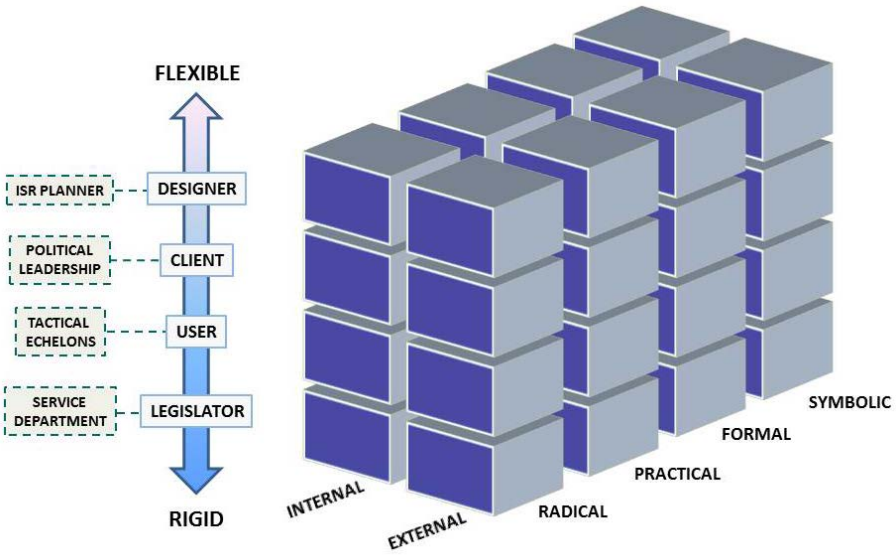

Figure 1. Lawson's Design Problem Model[19]

of Lawson's model provides a useful method for understanding constraints as a source of friction that ISR planners might encounter while planning theater airborne ISR missions. For example, one would normally not expect the political leadership to impose rigid constraints on assets employment in a tactical sense. However, in the age of the unmanned aerial vehicle, that may not

[19] Brian Lawson, *How Designers Think: The Design Process Demystified* (Oxford, UK; Elsevier, 2006).

always hold true. Policy makers could take a keen interest in whether an unmanned or manned airborne ISR asset deploys in a high threat area, and thus impose a radical constraint based on risk. The ISR planner may face additional friction from constraints generated at the user level, as users at tactical echelons may be subject to a wide range of radical, practical, formal, or symbolic constraints. Lawson's model provides a way to isolate these challenges in order to test them against mission command. Indeed, Helmuth von Moltke originally conceived mission command as a way of countering the friction generated by the unique constraints and challenges he faced as Chief of the Prussian General Staff.

MOLTKE AND MISSION COMMAND

Moltke the Elder served as the Chief of the Prussian General Staff from 1857 to 1888.[20] On the surface, it might appear as somewhat ironic that the general who once declared that "no plan of operations extends with any certainty beyond the first contact with the main hostile force"[21] is the same general who elevated planning and the Prussian General Staff to new heights.[22] The apparent contradiction reveals Moltke's approach to the art of warfare. According to Moltke, "commanders of the army corps and even of divisions must judge the situation for themselves and must know how to act independently in consonance with the general intention."[23] Moltke called for his commander's to exercise initiative, writing, "the advantage of the situation

[20] Richard M. Citino, *The German Way of Warfare* (Lawrence, Kansas: University Press of Kansas, 2005), 149.

[21] Helmuth von Moltke, *On the Art of War: Selected Writings,* ed. Daniel J. Hughes and trans. Daniel J. Hughes and Harry Bell (Novato, CA: Presidio Press, 1993), 92.

[22] Citino, 149.

[23] Moltke, 131.

will never be fully utilized if subordinate commanders wait for orders."[24]

The pivotal moment in Moltke's career came at the battle of Koniggratz. One month prior to the battle, on June 2, 1866, Prussia's King William I gave Moltke the authority to issue orders directly to his armies in the field.[25] This effectively made Moltke the commander of all Prussian forces arrayed for the war against Austria. The battle of Koniggratz began on July 3, 1866, and a survey of who stood with Moltke on a hilltop overlooking the battle provides some insight into Moltke's operating environment. The King, the Prussian Chief Minister of State Otto von Bismarck, and six train loads worth of ministers and accompanying staff joined Moltke on the hill.[26] Further, of the three main Prussian forces in the field, the King's son commanded one, and the other, which fought under Moltke and the King's direct observation at the outset of the battle, was commanded by the King's nephew.[27]

Following Lawson's model, it is immediately evident that Moltke had to contend with friction from internal constraints, given that his client, the King and most of Prussia's political leadership, was standing with him on the hill watching the battle unfold. Moltke's rivalry with Bismarck has become legend, and as Bismarck biographer Jonathan Steinberg points out, Bismarck "outmaneuvered all the generals except Moltke, with whom he eventually arrived at a truce of mutual respect."[28] That truce was years in the making and Bismarck's interactions with

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[24] Moltke, 132.

[25] Gunther Rothenberg, *Foreword to Moltke on the Art of War: Selected Writings*, ed. Daniel J. Hughes and trans. Daniel J. Hughes and Harry Bell (Novato, CA: Presidio Press, 1993), vii.

[26] Craig, 81.

[27] Citino, 165-169.

[28] Jonathan Steinberg, *Bismarck: A Life* (New York: Oxford University Press, 2011), 184.

Moltke approached the rigidity one would expect from Lawson's legislative sources of constraints. User generated constraints provided another source of friction in Moltke's planning and battlefield coordination. Citino suggests that Frederick Charles, who was the King's nephew and commander of the Prussian First Army, never really understood Moltke's plan at all and believed that chance and Austrian mistakes played a huge role in Prussia's victory.[29] Moltke's plan was to deploy the Prussian Army in such a way as to find and fix the Austrians with one wing, so that he could encircle or at least outflank with the other wings. His plan was further subject to friction from numerous practical constraints such as weather, terrain, and distance given the inherent difficulties of maneuvering and supplying what were essentially three army-sized forces in such a way that they could render mutual support to one another. This was the crucible of friction in which Moltke developed his views on command and the art of war.

Moltke's ideas form the intellectual bedrock for the United States Army's mission command philosophy. Army Doctrine Reference Publication (ADRP) 6-0 defines mission command as "the exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander's intent."[30] ADRP 6-0 identifies six principles to guide commanders in the exercise of mission command:

- Build cohesive teams through mutual trust
- Create shared understanding
- Provide a clear commander's intent
- Exercise disciplined initiative
- Use mission orders
- Accept prudent risk[31]

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[29] Citino, 170-171.

[30] United States Army, *ADRP 6-0, Mission Command*, http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/adrp6_0_new.pdf (accessed June 20, 2013), 2-1.

[31] Ibid., 2-1.

The mission command philosophy is the Army's response to the friction illuminated by Clausewitz and the quest for certainty described by Van Creveld. Indeed, ADRP asserts that "the mission command philosophy helps commanders counter the uncertainty of operations by reducing the amount of certainty needed to act."[32] The fundamental principles of mission command are applicable across all warfare domains, and examples of their application are apparent throughout military history. Mission command insulates military operations from friction, to include, where appropriate, friction imposed by Lawson's constraints.

Recently the United States Army's Combat Studies Institute published *16 Cases of Mission Command* to "help leaders at all levels better understand and execute mission command."[33] The mission command case studies range from Admiral Lord Viscount Horatio Nelson's victory at the Battle of the Nile to recent operations in Afghanistan.[34] The study evaluates each case by using the mission command principles defined in ADRP 6-0. Another case study highlights the Battle of Gettysburg, where chief engineer Brigadier General Gouverneur Warren, courier First Lieutenant Ranald Mackenzie, and brigade commander Colonel Strong Vincent exercised initiative within General Meade's intent by defending the Union left flank at Little Round Top.[35]

There were other examples of mission command in action at Gettysburg. For example,

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[32] Ibid.

[33] Lieutenant General David G. Perkins, *Foreword to 16 Cases of Mission Command*, http://usacac.army.mil/Cac2/cgsc/carl/download/csipubs/SixteenCasesOfMissionCommand.pdf (accessed September 2, 2013), iii.

[34] *16 Cases of Mission Command*, Donald P. Wright, ed., http://usacac.army.mil/Cac2/cgsc/carl/d ownload/csipubs/SixteenCasesOfMissionCommand.pdf (accessed September 2, 2013), vii.

[35] Ibid., 20.

Union cavalryman Brigadier General John Buford, with "precious little guidance from headquarters," not only found the Confederate army as it approached Gettysburg but also opted to fight a delaying action until help could arrive.[36] His initiative bought the Union Army precious time during which key terrain might have been lost. Cavalry operations at Gettysburg did not go as well for the Confederacy. While uncertainty and friction haunted the Army of Northern Virginia on its march north, the epic tale of Confederate cavalryman J.E.B Stuart at Gettysburg has much to offer to the study of reconnaissance operations and mission command.

J.E.B STUART AND MISSION COMMAND AT GETTYSBURG

The latter half of the 19th century marked the beginning of a transition period for horse cavalry. Railroads could move masses of infantry, the telegraph increased connectivity, and rifled barrel firearms increased the infantry's range and lethality.[37] These technological advances each had a significant impact on American Civil War battlefields. Given the changes that were beginning to take place in Prussia, Moltke recognized the potential of cavalry as an armed reconnaissance force. Moltke wrote that "reconnaissance is the proper and almost exclusive province of the cavalry."[38] Reflecting his practice of the art of war, he further noted that a cavalry division must be "independent to the highest degree" and that "advancing ahead of the army at as great a distance as possible, they are the best means to gain insight into the general situation."[39] At Koniggratz, a small detachment comprised of one staff officer, a lance corporal, and 16

[36] Stephen W. Sears, *Gettysburg* (New York: Houghton Mifflin Company, 2003), 143-144, 157.

[37] Citino, 148-149.

[38] Moltke, 251.

[39] Ibid.

uhlans, or light cavalrymen, exercised initiative and gained critical intelligence upon which arguably the entire battle turned.[40] Just three years prior to Moltke's historic victory, Confederate generals Robert E. Lee and J.E.B. Stuart unknowingly put Moltke's concept of independent cavalry operations to the test, but with far different results.

J.E.B. Stuart was a bold cavalryman. Modern U.S. Army doctrine suggests that mission command is impracticable unless exercised from a basis of trust fostered by integrity and personal example.[41] Stuart exhibited these qualities with panache and daring. Jeffrey Wert, in his biography of J.E.B Stuart, writes that "beneath the veneer of a cavalier's trappings of a plumed hat and gold-braided uniform was a gifted cavalryman with the soul of a warrior," a fighter who led his troopers with "unquestioned personal courage."[42] General Lee trusted his youngest general, and together they exercised something very close to mission command. To understand the nature of their command relationship, and the trust that Lee had in Stuart, one must begin at West Point.

Stuart, a native son of Virginia, was a member of West Point's class of 1854. Prior to the start of Stuart's third year, then Major Robert E. Lee became superintendent. Stuart had previously become close friends with Lee's son, Custis Lee, and Stuart frequently joined Custis on weekend visits to his father's home. Mary Custis Lee, the wife of the superintendent, considered Stuart to be a member of her family, and Stuart felt she treated him as another son.[43] Stuart graduated thirteenth in his class of forty-six, down from an original size of ninety-three,

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[40] Craig, 84.

[41] United States Army, *ADRP 6-0, Mission Command* http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/adrp6_0_new.pdf (accessed June 20, 2013), 1-1.

[42] Ibid.

[43] Ibid., 17-18.

and shortly after graduation, Stuart headed west.[44]

After a short stint in Texas, Stuart reported to Fort Leavenworth, where he began his career as a cavalryman and found himself confronted with the torrent of events that eventually led to the Civil War.[45] Given the fierce divide over whether slavery would extend into the territories, "Bleeding Kansas" was becoming one of the first battlefields in the Civil War. Indeed, Stuart's path back into the service under Robert E. Lee began with an expedition against the violent abolitionist, John Brown. On May 24, 1856, Brown and a small group of his followers used broadswords to kill a group of six pro-slavery Southerners. Stuart was part of the unit assigned to hunt Brown down. Stuart and his unit were successful in disarming the group, but Brown escaped arrest despite the murders.[46] Stuart would meet Brown again at Harper's Ferry, Virginia.

In 1885, Stuart's adjutant with the cavalry in the Army of Northern Virginia, Henry B. McClellan, published a biography on his former commander. McClellan writes that from 1857 until the summer of 1860, Stuart was stationed at Fort Riley in the Kansas territory and that during the winter of 1858, Stuart invented a saddle attachment for sabers.[47] During the fall of 1859, Stuart took leave from Fort Riley and headed home to his native Virginia. While Stuart was on leave, the War Department summoned him to a meeting in Washington D.C. in order to discuss the purchase of his saddle saber attachment.[48] Stuart spent the night before the meeting,

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[44] Ibid., 44.

[45] Ibid., 25.

[46] Ibid., 30-31.

[47] Henry B. McClellan, *The Life and Campaigns of Major-General J.E.B. Stuart: Commander of the Cavalry of the Army of Northern Virginia* (Boston: Houghton, Mifflin and Company, 1885), 28.

[48] Ibid.

October 16, 1859, at Robert E. Lee's Arlington home.[49] Stuart was in Washington the next day when reports began to arrive at the capitol about John Brown's raid at Harper's Ferry. Stuart offered his services to Secretary of War John B. Floyd who dispatched him back to Arlington with a message for Lee to report at once. After delivering the message, Stuart volunteered to serve as Lee's aide, and the two of them soon found themselves back at the War Department in a meeting with Secretary Floyd and President James Buchanan.[50] The Secretary of War placed Lee in command of a group of Marines and Maryland militia, and, with Stuart in tow, Lee proceeded with the detachment to Harper's Ferry.[51] Stuart's own words, from a letter to his mother published by McClellan, best describes what happened next:

> I was deputed by Colonel Lee to read to the leader, then called Smith, a demand to surrender immediately; and I was instructed to leave the door after his refusal, which was expected, and wave my cap; at which signal the storming party was to advance, batter open the doors, and capture the insurgents at the point of the bayonet. Colonel Lee cautioned the stormers particularly to discriminate between the insurgents and their prisoners. I approached the door in the presence of perhaps two thousand spectators, and told *Mr. Smith* that I had a communication for him from Colonel Lee. He opened the door about four inches, and placed his body against the crack, with a cocked carbine in his hand: hence his remark after his capture that he could have wiped me out like a mosquito…when Smith first came to the door I recognized old Osawatomie Brown, who had given us so much trouble in Kansas.[52]

Of course, Stuart waved his hat, and John Brown's brief insurrection at Harper's Ferry ended. Stuart boldly risked his life in carrying Lee's message to Brown. Stuart wrote of Lee, "I presume no one but myself will ever know the immense but quiet, service he rendered the state and the

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[49] Ibid.

[50] Wert, 37-38.

[51] Ibid., 38.

[52] McClellan, 29-30.

country on this day."[53]

Trust is fundamental to mission command. ADRP 6-0 states, "trust comes from successful shared experiences and training" and asserts, "developing trust takes time," and that it must be earned.[54] The importance of trust in mission command cannot be overstated. If mission command is to provide a basis for the effective execution of theater airborne ISR operations, airmen and soldiers must work to develop trust strong enough to hold up regardless of the circumstances of deployment. At Harper's Ferry, Lee had to send forward someone to provide terms to a homicidal criminal and then signal an attack. He chose someone he trusted. Following the Harper's Ferry incident, Stuart returned to Fort Riley. As the nation spiraled towards the Civil War, there was never any doubt about what Stuart would choose. In a letter to a friend and fellow officer, Stuart wrote, "for my part, I have no hesitancy from the first that, right or wrong, alone or otherwise, I go with Virginia."[55]

By June of 1863, Stuart was one of the most renowned and famous officers in the Confederate Army. He was, after all, the "bold dragoon" who had ridden around George McClellan and the Army of the Potomac, and he looked the part. Wert recalls the words of a Georgia infantry Captain who wrote, "never have I seen such a magnificent looking soldier. Faultlessly dressed, grandly mounted, with long, silky, auburn locks curling beneath his plumed hat." [56] The Richmond newspapers frequently reported his exploits. Early in the war, Stuart's charge with the 1st Virginia Cavalry Brigade helped rout the Union forces at Bull Run, and his

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[53] Wert, 39.

[54] ADRP 6-0, 2-1.

[55] Ibid., 43.

[56] Ibid., 80.

promotion to Major General followed his legendary "Ride around McClellan" during the 1862 Peninsula campaign.[57]

However, Stuart took offense at his treatment in the papers after the Battle of Brandy Station, where Union cavalry under Alfred Pleasonton nearly defeated Stuart's forces in the largest cavalry battle ever fought on American soil. Stuart wrote to his wife "the *Richmond Examiner* of the 12th lies from end to end."[58] Numerous historians have cited Stuart's sense of personal honor and pride in his image as factors in the decisions he made leading up to Lee's second invasion that culminated at Gettysburg. The assertion is that he felt a compelling need to recapture his glory, and that excessive pride lead Stuart to overlook Lee's implied constraints. If true, then Stuart's pride might have led him to a self-imposed internal constraint where riding around the Union Army became the only option. Whatever the case, pride is a source of friction, particularly if it subverts *disciplined* pursuit of initiative within the commander's intent.

Lee might have been well served to keep Stuart's sensitivities in mind prior to the outset of the campaign. The end-result gives rise to one of the "myths" offered as explanation for Lee's defeat at Gettysburg; that Stuart rode for glory and left Lee blind at his moment of greatest need. In Michael Shaara's popular work of historical fiction, *The Killer Angels*, Shaara all but court-martials J.E.B Stuart.[59] Stuart's return to the main body of the Army of Northern Virginia is particularly poignant, as Shaara depicts a scene in which Lee verbally scolds Stuart:

> "You were the eyes of this army…you were my eyes. Your mission was to screen this army from the enemy cavalry and to report any movement by the enemy's main body.

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[57] Eric J. Wittenberg and J. David Petruzzi, *Plenty of Blame to Go Around: Jeb Stuart's Controversial Ride to Gettysburg* (New York: Savas Beatie, 2011), xvii.

[58] Ibid., xvii.

[59] Michael Shaara, *The Killer Angels* (New York: Ballantine Books, 1974), 14, 82, 248, 265-266.

> That mission was not fulfilled…it is only by God's grace that we have escaped disaster."[60]

Lee could not have been pleased with the situation he found himself in at Gettysburg. While it is possible that personal pride affected Stuart's decisions, events were more complex than the myth propagated by Shaara, and later by Ted Turner's movie *Gettysburg*. The historical record points to a failure of a different kind. In modern doctrinal terms, Lee and Stuart's failure remind us that uncertainty, friction, chance, and a determined enemy can lead to a breakdown in mission command in any type of operation.

The first step in understanding Stuart's experience in modern terms of mission command and Lawson's design problem constraint model is to examine Stuart's orders from General Lee. From June 17, 1863, to June 21, 1863, Stuart had fought important screening engagements on the Confederate right flank at Upperville, Middleburg, and Aldie. Those fights were tactical victories for the Union cavalry and Stuart had lost 500 men, but his cavalry had served its operational purpose of screening the Confederate Army's move north.[61] At some point in June, Stuart had proposed to Lee that he divide his cavalry forces at the outset of what would become the drive to Gettysburg. On June 22, Lee sent Stuart his first set of orders for the planned offensive:

> General…I judge the efforts of the enemy yesterday were to arrest our progress and ascertain our whereabouts. Perhaps he is satisfied. Do you know where the enemy is and what he is doing? I fear he will steal a march on us, and get across the Potomac before we are aware. If you find he is moving northward, and that two brigades can guard the Blue Ridge and take care of your rear, you can move with the other three into Maryland, and take position on [Lt. Gen. Richard S.] Ewell's right, place yourself in communication with him, guard his flank, keep him informed of the enemy's movements, and collect all the supplies you can for the use of the army.[62]

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[60] Ibid., 265

[61] Wert, 257.

[62] Wittenberg and Petruzzi, xx.

Ewell was the new commander of the Confederate Second Corps, having replaced the fallen Stonewall Jackson. Before the orders went to Stuart, they passed through the commander of the First Corps, Lt. Gen. James Longstreet, who forwarded the note with a message of his own:

> I think you can move across the Potomac without disclosing our plans. He [Lee] speaks of your leaving, via Hopewell gap, and by passing by the rear of the enemy. If you can get through by that route, I think that you will be less likely to indicate what our plans are than if you should cross by passing to our rear.[63]

Lee was preparing to move his Army north. His orders from June 22 clearly indicate that he endorsed Stuart's plan in principal. Longstreet's subsequent note only reinforced Lee's message and indicated that Stuart's movement to General Hooker's rear might confuse the Union commander as to movement of the Confederate main body. The next day Lee informed Lt. Gen. Ewell to watch for Stuart on Ewell's right:

> I also directed General Stuart, should the enemy have so far retired from his front as to permit of the departure of a portion of the cavalry, to march with three brigades across the Potomac, and place himself on your right and in communication with you, keep you advised of the movements of the enemy, and assist in collecting supplies for the army.[64]

Lee followed his note to Ewell with a second set of orders for Stuart:

> If General [Joseph] Hooker's army remains inactive, you can leave two brigades to watch him, and withdraw with three others, but should he not appear to be moving northward, I think you had better withdraw this side of the mountain to-morrow night, cross at Sheperdstown next day, and move over to Fredericktown.
>
> You will, however, be able to judge whether you can pass around their army without hindrance, doing them all the damage you can, and cross the river east of the mountains. In either case, after crossing the river you must feel the right of Ewell's troops, collecting information, provisions, &c.
>
> Give instructions to the commander of the brigades left behind, to watch the flank and rear of the army, and (in the event of the enemy leaving their front) retire from the mountains west of the Shenandoah, leaving sufficient pickets to guard the passes, and

[63] Ibid., xxi.

[64] Ibid., xxii.

bringing everything clean along the Valley, closing upon the rear of the army.[65]

Stuart had his orders. Ultimately, it is clear that Lee trusted his subordinate to make the decision on what route to take in support of the overall plan based on conditions as he saw them.

Whether or not Stuart made the right decision based on the situation that he observed is beyond the scope of this paper, as is the closely related issue of who is to blame for Lee's dearth of intelligence on his enemy's whereabouts prior to Gettysburg. However, examining the orders Stuart issued to the two brigade commanders that he left behind is relevant to the study of mission command. The maps included at Appendix A and Appendix B provide an overview of Stuart's movements in the Gettysburg campaign. The influence of terrain is evident, and much of the war in the East focused on the passes through the Shenandoah mountains. Appendix A depicts Stuart's cavalry defense of two key passes as Lee's army pushed north.

As instructed by Lee, and depicted in Appendix B, Stuart left two brigades, commanded by Brigadier Generals William E "Grumble" Jones and Beverly Robertson, guarding Ashby's and Snicker's gap. Stuart's orders to Jones, who outranked Robertson, included the following:

> General: Your own and General Jones' brigades will cover the front of Ashby's and Snicker's Gaps, yourself, as senior officer, being in command.
>
> Your objective will be to watch the enemy; deceive him as to your designs, and harass his rear if you find he is retiring. Be always on the alert; let nothing escape your observation, and miss no opportunity which offers to damage the enemy.
>
> After the enemy has moved beyond your reach, leave sufficient pickets in the mountains, withdraw to the west side of the Shenandoah, place a strong and reliable picket to watch the enemy at Harper's Ferry, cross the Potomac, and follow the army, keeping on its right and rear.[66]

That these two cavalry brigades stayed in the gaps as depicted on the map in Appendix B, despite

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[65] Ibid.

[66] Wittenberg and Petruzzi, xxv.

the entire Union Army's move to the north, is another perfect example of friction. Stuart's former adjutant, Henry McClellan, defended his former commander on this point, writing:

> The arrangements which Stuart made for obtaining information appear to have been adequate to the occasion, and it seems strange that General Lee did not use Robertson and Jones for this purpose… he does not appear to have called upon him for such service; nor can it be discovered that Robertson made effort in that direction. He remained in the vicinity of Berryville until the 1st of July, on which day he was ordered by General Lee to join the army in Pennsylvania. [67]

One is reminded of Moltke's call for subordinates who understand the commander's intentions well enough to seize initiative, and not wait for orders. Yet, both Lee's orders to Stuart, and Stuart's orders to his brigade commanders, come close to meeting mission orders criteria. Why then, did these orders fail to deliver the outcome that the respective commanders had in mind?

Mission orders are what provide functionality and impetus to the mission command philosophy. According to ADRP 6-0, "commanders use mission orders to assign tasks, allocate resources, and issue broad guidance."[68] Further, commanders write mission orders to "provide subordinates the maximum freedom of action in determining how to best accomplish missions" and they rely on "lateral coordination between units and vertical coordination up and down the chain of command."[69] Lee's orders to Stuart appear to meet the broader requirements that modern doctrine sets for mission orders. Lee attempted to give Stuart as much leeway as possible. He also attempted to establish lateral coordination between Stuart and Ewell. Further, Lee was clearly concerned about the enemy's movements and attempted to write Stuart's orders in such a way as to provide guidance across a range of possible enemy actions.

Still, the outcome was not what either Lee or Stuart had in mind. There are several

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[67] McClellan, 335.

[68] ADRP 6-0, 2-4.

[69] Ibid.

explanations, many of which broadly fall under the category of friction in war. Carl von Clausewitz wrote that "everything in war is very simple, but the simplest thing is difficult" given how "countless minor incidents-the kind you can never really foresee-combine to lower the general level of performance, so that one always falls short of the intended goal."[70] Echoing Clausewitz, Army Doctrine Reference Publication (ADRP) 3-0 states that "risk, uncertainty, and chance are inherent to all military operations" and that "commanders accept risk and seek opportunity to create and maintain the conditions necessary to seize, retain, and exploit the initiative and achieve decisive results."[71] Furthermore, current United States Army Tactics, Techniques, and Procedures (ATTP) 5-0.1 requires that any course of action (COA) be feasible, meaning the COA must be able to "accomplish the mission within the established time, space, and resource limitations."[72] Lee and Stuart probably did not have access to Clausewitz and they certainly did not have access to ATTP 5-0.1, but they were experienced soldiers, more than capable of judging uncertainty, risk, and feasibility.

Lawson's design problem model provides an additional framework for understanding how Ewell stumbled into the Union Army without the support of Stuart's cavalry as envisioned by Lee. Applying Lawson's model, Lee is the client, and the radical constraint that he imposed upon Stuart was that he "must feel the right of Ewell's troops" while "collecting information" upon crossing the Potomac River. In Lawson's model, Stuart is the designer, free to design his reconnaissance operation within Lee's orders and intent, which included the guidance that Stuart would "be able to judge" whether he could "pass around their army without hindrance." The

[70] Clausewitz, 119.

[71] United States Army, *ADRP 3-0 Unified Land Operations*, http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/adrp3_0.pdf (accessed February 17, 2013), 4-9.

[72] United States Army, *ATTP 5-0.1 Commander and Staff Officer Guide*, http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/attp5_0x1.pdf (accessed September 14, 2013), 14-16.

ultimate question of Stuart's culpability rests in whether he simply made a mistake in properly judging practical constraints such as time, distance, terrain, and the enemy's impact on his ability to carry out what might have been infeasible orders or whether he failed to properly weight Lee's radical constraint in deciding upon his course of action.

There were numerous practical constraints. Returning to Appendix A and B, the maps clearly depict the effects of terrain and distance on the Gettysburg campaign. The impact of the terrain alone should have given cause for Lee, Longstreet, or Stuart to question the feasibility of the plan. As of June 24 the Union Army was still south of the Potomac and Stuart was far to the south along with it, watching and preparing to make his ride. With every passing hour, Stuart's chances of finding Ewell's right flank were becoming less feasible, given Ewell's march north, and the distance and external constraints imposed by the movements of the Union Army. The map at Appendix B depicts the general situation as of June 28, 1863, as well as Stuart's clash with Hancock's Second Corps on June 25. This was a pivotal moment in the outcome of the campaign. Stuart realized that Hancock's Second Corps formed the extreme left of the Army of the Potomac, which was clearly moving north. Stuart dispatched a message to General Lee. A copy of that message made it to the Confederate War Department in Richmond, but somehow the message never made it to General Lee.[73] This was an instance of Clausewitzian friction at its finest. Had that message gotten through, General Lee might have known the Union Army had guessed his intentions and planned accordingly. Left open, is the question of whether Stuart levied upon himself what might be thought of as a symbolic constraint in Lawson's model. Given Stuart's penchant for glory, and his desire to change his narrative as portrayed by the Richmond newspapers, it is entirely possible that he felt he had no choice but to attempt another ride around

[73] Wittenberg and Petruzzi, 3-8.

the Union Army.

A few years after the end of the American Civil War, Moltke wrote, "a cavalry division is independent to the highest degree. Free to move as it pleases, it can easily avoid precarious situations by its mobility and may therefore risk much."[74] Stuart risked much, and his situation only grew more precarious. He could have reversed his course on June 25, but Wittenberg and Pertruzzi, through detailed analysis, suggest it would have taken Stuart until at least June 27 to get to the Potomac at Shepardstown given the many miles of mountainous roads and a significant downpour of rainfall.[75] Again, these were external, practical constraints that he could not overcome. Moltke wrote, "there are many situations in which the officer must act according to his own judgment."[76] Stuart made the determination to cross the Potomac further to the southeast before pushing north in search of the Confederate main body. As Figure 2 depicts, Stuart was in in the Union Army's rear and in position to both capture supplies and interfere with Union Army communications, which he did with some success despite near constant contact with the enemy. Yet, once again, each passing hour took him further away from meeting Lee's intent, and all the while, Jones and Robertson sat idly back at Snicker's and Ashby's Gap instead of moving north to rejoin Lee as Stuart had intended.

What relevance does Stuart's experience at Gettysburg hold for airborne ISR operations? Stuart's role in Gettysburg serves to remind airborne ISR planners that mission command is not a panacea. Mission command also requires commanders's to clearly articulate their intent. Perhaps Lee was too ambiguous in his guidance to Stuart in following "I think you had better withdraw this side of the mountain to-morrow night" with "you will, however, be able to judge whether you

[74] Moltke, 252.

[75] Wittenberg and Petruzzi, 9-10.

[76] Moltke, 177.

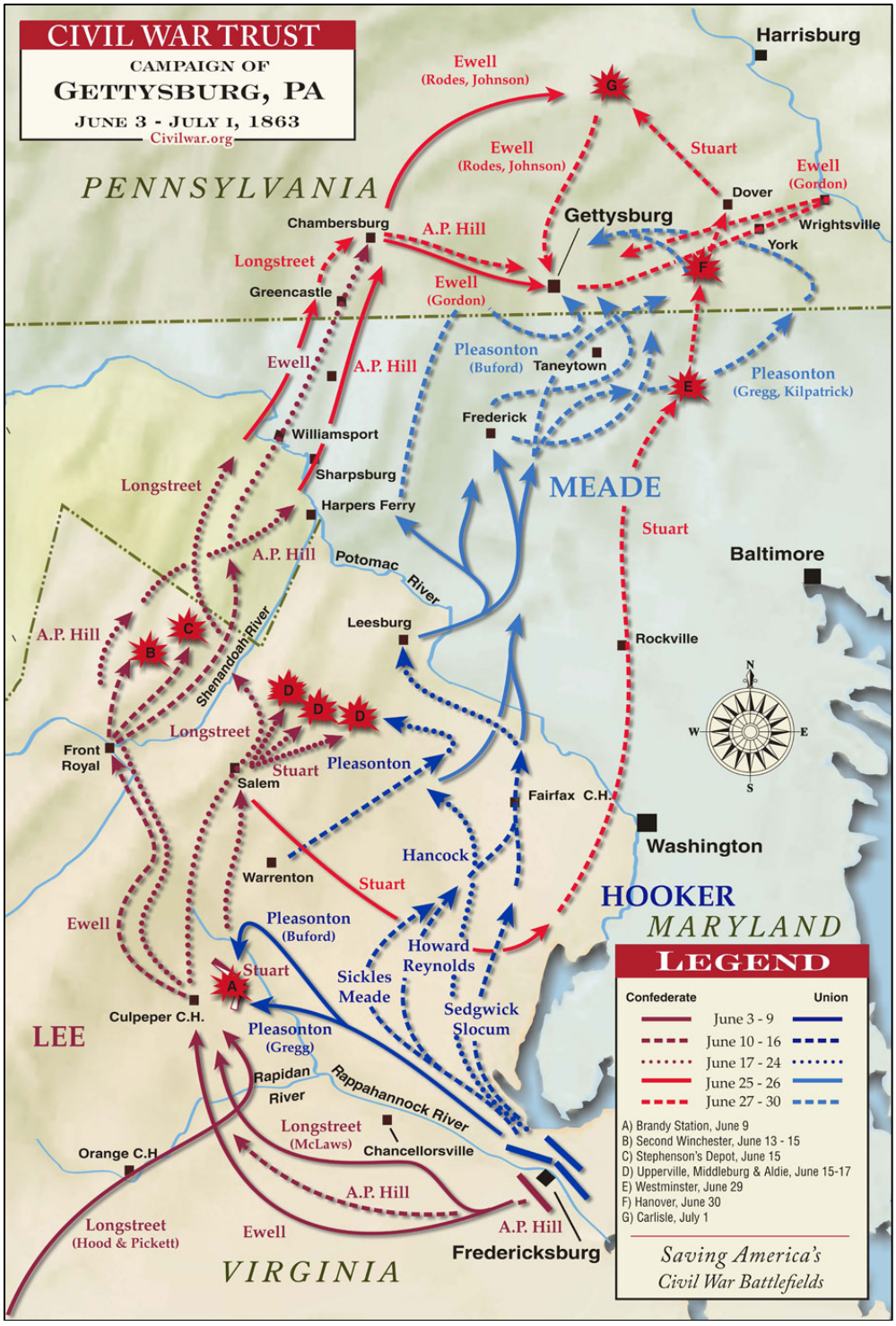

Figure 2. Gettysburg Campaign, June 3 – June 30, 1863
Source: Civil War Trust, Steven Stanley, Campaign of Gettysburg, Pennsylvania, http://www.civilwar.org/battlefields/gettysburg/maps/gettysburg-campaign-map.html (accessed October 21, 2013)

can pass around their army without hindrance" by crossing the Potomac east of the mountains.[77] Lee was clear that he wanted Stuart to support Ewell. He might have been more clear about what he meant by "without hindrance," perhaps by bounding Stuart's decision with a time constraint.

In addition to a clearly articulated commander's intent, mission command requires well-trained, active subordinates capable of seizing the initiative in face of ambiguity. Ultimately, Lee had this in Stuart, who had previously had great success operating deep in the enemy's battlespace. Given the very nature of air operations, airmen bring a deep-battle, theater-wide approach to combat operations. The capability and flexibility of Air Force ISR sensors, along with an engrained desired to exercise initiative, can lead to situations where assets are redirected, perhaps mid-mission, against other targets that may be of a higher priority to the joint force commander. This type of scenario is captured well by Air Force Major Travis Burdine in a *Air and Space Power Journal* article published in 2009. Burdine describes a scenario in which the Combined Air Operations Center (CAOC) re-directs an unmanned aircraft asset from one unit to another in accordance with the Joint Force Commander's intent, which causes a division commander to cancel an important, long-planned operation.[78] In that type of scenario, even if everyone involved does the right thing, absent good practice of mission command the division commander who lost the asset might be left wondering why his operation was put at risk.

The key for the command authority, which for Air Force theater ISR assets is the Air Operations Center, is in determining the appropriate degree of control, the corresponding control measures, and exercising that control through the staff and the chain of command. However, even

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[77] Wittenberg and Pertruzzi, xxii.

[78] Travis Burdine, "The Army's "Organic" Unmanned Aircraft Sytems: An Unhealthy Choice for the Joint Operational Environment," *Air and Space Power Journa Summer 2009*, (June 1, 2009): http://www.airpower.maxwell.af.mil/airchronicles/apj/apj09/sum09/burdine.html (accessed September 14, 2013).

the best orders and most clearly defined control measures are not immune to the effects of fog and friction. Moltke wrote that "no plan of operations extends with any certainty beyond the first contact with the main hostile force."[79] Indeed, ADP 6-0 *Mission Command* states:

> The unpredictability of human behavior affects military operations. Commanders face thinking, uncooperative, and adaptive enemies. They can never predict with certainty how enemies will act and react, or how events will develop. Even the behavior of friendly forces is often uncertain because of the effects of stress, mistakes, chance, or friction. [80]

Stuart's experience in the Gettysburg campaign exemplifies the impact unpredictable behavior, chance, friction, and adaptive enemies can have on operational planning. Lawson writes that designers must negotiate a solution that "meets the relative and disparate sets of criteria which are held, often implicitly, by clients, users, and legislators."[81] Combined with the fog and friction of war, this captures the essence of how an approach to command so relatively close to modern mission command practices failed Lee and Stuart. Lawson's assertion also translates to those who plan and task airborne ISR operations. There are indeed "disparate sets of criteria" that planners must understand and balance in order to optimally employ assets to satisfy strategic, operational and tactical level intelligence requirements.

Still, the experience of Lee and Stuart at Gettysburg is not an argument against the practice of mission command in airborne ISR operations. Instead, their saga is an example why of developing mutual understanding and trust between airborne ISR operators, planners, and clients is so vital. Stuart's saga also highlights how critical determining the proper degree of control is to the success of tactical operations. This is an important part of mission command in any type of

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[79] Moltke, 92.

[80] United States Army, *ADRP 6-0 Mission Command*, http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/adrp6_0_new.pdf (accessed March 13, 2013), 1-1.

[81] Lawson, 110."

operation. The purpose of airborne ISR operations and intelligence is to reduce uncertainty or mitigate resultant friction. Airmen and soldiers should make every effort to prevent airborne ISR collection from becoming a source of friction in and of itself. This was a hard lesson for J.E.B. Stuart.

What then is the proper degree of control required for successful integration of modern airborne ISR operations? Airborne ISR provides an incredible set of capabilities to the modern joint force commander; capabilities further enhanced by the introduction of persistent and lethal unmanned aerial sensors. However, there is a natural distance between airborne ISR collection and processing and ground forces. Reporting, plans, and other forms of communication combine in an effort to bridge that gap between airborne ISR and ground forces, yet challenges remain.

AERIAL RECONNISSANCE IN WORLD WAR I AND MODERN AIRBORNE ISR OPERATIONS

J.E.B. Stuart's Gettysburg saga played out at about the same time that Moltke rose to prominence in Prussia, and Confederate veterans who rode with Stuart were still alive four decades later, when powered flight was born at Kitty Hawk, North Carolina.[82] Soldiers and airmen have been confronting the challenges posed by integrating the tools of their respective warfare domains since before World War I, and almost as early as the dawn of flight. Lieutenant Colonel Tyler Morton asserts that the challenge of integrating intelligence collected from the air with land forces was "foreseen as early as 1907 by Benjamin Foulois," a future chief of the Air Corps.[83] Indeed, the development of mutual trust and shared understanding have long been

[82] One notable example is Fitzhugh Lee, Stuart's close friend and one of his brigade commanders. Lee was the nephew of Robert E. Lee. He served as governor of Virginia after the war and died in 1905, two years after the Wrights flew at Kitty Hawk, http://www.encyclopediavirginia.org/Lee_Fitzhugh_1835-1905

[83] Tyler Morton, "Manned Airborne Intelligence, Surveillance, and Reconnaissance:

fundamental challenges in the integration of airborne ISR with ground forces.

Blom exposes these challenges in his vignette by suggesting that ground forces would have received inadequate support from CONUS-based UAS operators. This is a perception of Air Force provided reconnaissance that formed early among soldiers, as indicated by the reports of U.S. Army artillerymen after World War I. The artillerymen vigorously pursued organic aerial reconnaissance and observation support. In December 1918, Brigadier General Andrew Hero presided over a group of artillery officers to study the Army's employment of artillery in World War I.[84] The *Hero Report* examined a wide-range of issues, to include the use of aerial reconnaissance for artillery spotting. The senior artillery officers quoted in the report appear to have been candid in their remarks:

> This Brigade had little or no assistance from friendly air service, but suffered serious losses from hostile air services.
>
> - H.D. Todd, Jr., Brigadier General, 58th Brigade[85]

> Aerial observation in my experience has been conspicuous by its absence. Had the American Air Service built observation and chasse planes instead of the bombing planes the American army might have been a much stronger organization than it was.
>
> - A.J. Bowley, Brigadier General, 6th Corps Artillery[86]

> Aerial observation was very unsatisfactory throughout our operations. The Air Service, in my judgment, has two functions, the primary of which is reconnaissance, and the secondary that of preventing hostile reconnaissance. Battles are won on the ground, and the Air Service performs its functions best when it provides the troops, and more especially the artillery, with the information that will enable the troops to successfully operate against the enemy. It is believed that our Air Service had the tendency to indulge

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Strategic, Tactical…Both?" *Air and Space Power Journal Nov-Dec 2012 Volume 26, No. 6* (December 2012): 38, http://www.airpower.maxwell.af.mil/digital/PDF/Issues/2012/ASPJ-Nov-Dec-2012.pdf (accessed February 14, 2013).

[84] Andrew Hero, *Report of the Hero Board* (December 9, 1918) http://handle.dtic.mil/100.2/ADA161150 (accessed July 14, 2013), 1.

[85] Ibid., 667.

[86] Ibid., 663.

> in combat rather than to perform the functions of reconnaissance and the adjustment of artillery fire…it is believed that notoriety for aerial combat should be frowned upon and men should be specially rewarded for successful reconnaissance.
>
> -D.E. Autman, Brigadier General, Army Artillery, 2nd Army[87]

While critical of the contributions from aerial reconnaissance and observation during the World War I, the authors of the *Hero Report* could see great potential. Colonel Albert Cox of the 113th Field Artillery stated in the *Hero Report* that "the help given the artillery by the airplane should be enormous."[88] Artillery officers could see the potential, and their proposed solution was organic control of aviation assets.

What the artillerymen meant by organic control was that aircraft should be attached to the Corps or Division, thus enabling the Corps or Division commander to directly task the asset to support operations at lower echelons. The artillerymen's fight for organic control of aerial observation and reconnaissance assets began with the *Hero Report*.

> Not only should observers be taken from the Artillery, but all air units for artillery observations and reconnaissance must be absolutely under the Division or Corps as part of the organic strength. No independent Corps or arm will give good results.
>
> -C.P. Summerall, Major General, 5th Corps[89]

> A flight of at least four airplanes should be a constituent part of each field artillery brigade. Such flight should be under the direct orders of the brigade commander and should be trained with the brigade. In no other way can prompt and satisfactory serial observation be assured.
>
> -J.F. Walker, Colonel, 314th F.A.[90]

The artillerymen continued to make this argument through to World War II. Indeed, in an article published in 1941, which was regarded by *Army Aviation Digest* as "a significant event that led to

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[87] Ibid., 662.

[88] Ibid., 663.

[89] Ibid., 667

[90] Ibid.

the birth of Army aviation," Major William Ford wrote:

> Having the plane, pilot and observer constantly assigned to the battalion they serve has great and obvious advantages. Close teamwork is achieved through this permanent relationship. The plane accompanies the battalion by short hops. It is ready at the moment it is needed. Moreover, each battalion has this invaluable aid; no longer does the battalion commander hope in vain for the brief use of a plane said to be on some distant airdrome "on call."[91]

Major Ford's article in *Field Artillery Journal* was an expression of the ideas put forward by artillerymen for two decades. The basic concept was that the only way to deliver adequate aerial reconnaissance support to soldiers was to use soldiers in an aerial reconnaissance role. For the World War I artillerymen, Air Force support had been tried and found wanting. Interestingly, some modern-day soldiers familiar with operations in Iraq and Afghanistan echo Ford on the merits of organic control.

For example, one soldier returned from his deployment in Iraq and related how his unit paid $1 million per month to a civilian contractor in order to employ a Predator-like capability called "AirScan" to monitor the Iraqi-Syrian border. In an interview conducted with the Combat Studies Institute, he related:

> An AirScan is a civilian contracted aircraft. It's a little Cessna 337 that has a motorcycle engine…it's run by a company out of Florida and they're all retired military personnel. They have the same capabilities as the Predator, the same optics, but it's manned. There's a pilot and a sensor operator. For the small fee of one million dollars a month, we contracted them to fly 80 hours a month for us. What was great about them was that they came and lived with us. They were our assets. They were at my morning battle update brief (BUB) and they were part of the company.[92]

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[91] William, W. Ford, "Wings for Santa Barbara," *United States Army Aviation Digest June 1974*, Reprint of *Field Artillery Journal May 1941* (June 1974): 12-15, http://www.rucker.army.mil/avjournal/1970/1974/AVN_DIG_1974_06.pdf (accessed September 3, 2013).

[92] Major Tom Hough, interviewed by Major Jeff Daniels, July 30, 2008, transcript, Operational Leadership Experiences Collection, Combat Studies Institute, Fort Leavenworth, Kansas, https://server16040.contentdm.oclc.org/cdm4/item_viewer.php?CISOROOT=/p4013coll13&CISOPTR=1158 (accessed June 25, 2013).

That sentiment that it was important that the AirScan operators "lived with us" would be familiar to World War I artillerymen. Lieutenant General Michael T. Flynn, the current Director of the Defense Intelligence Agency, provides another example from the Special Operations Forces (SOF) community:

> A critical enabler in employing ISR was having forward processing, exploitation, and dissemination (PED) integrated into the Tactical Operations Center (TOC). The Air Force has excelled at building state-of-the-art reachback PED nodes. But the speed and intuition required to cross-cue, target, plan, and react amidst multiple streams of intelligence and operations in a highly fluid battlespace require a forward PED presence able to interact in that environment. The reachback nodes simply do not have the situational awareness one gains by physically being forward with supported operations and other intelligence personnel.[93]

Defence Management Journal records another example from an interview in late 2012 with Lieutenant Colonel Victor Hamilton, a battalion commander at the Army's Aviation Center of Excellence at Fort Rucker, and two of his Senior Non-Commissioned Officers (SNCO), Sergeant First Class Harris (SFC) and SFC Miller. Harris and Miller contend:

> The role of UAS in the army, SFC Harris begins, is different from that in the Air Force: "For our soldiers, we are actually embedded with those ground commanders. We're part of that unit, so for us, we're there to capture the battlefield in real-time video for commanders so they can make decisions on the ground." Incorporating UAS personnel into ground units, says SFC Miller, "makes a world of difference". The ground unit, he says, "is the guys that we eat with, bunk with, work out with and hang out with after work," and there is a benefit to that. "Not that we don't work hard…but you are a little more dedicated to the mission if you actually know the guys who are going out on it."[94]

The convictions of these soldiers represent important, enduring arguments about airborne ISR operations. Perhaps it is simply part of the human experience to trust whom you can see, or as

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[93] Michael T. Flynn, Rich Juergens, and Thomas L. Cantrell, "Employing ISR: SOF Best Practices," *Joint Force Quarterly, no. 50* (3rd Quarter 2008): 59, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA516799 (accessed April 16, 2013).

[94] "From the Ground Up," *Defence Management Journal Issue 58*, Fall 2012. http://www.defencemanagement.com/article.asp?id=588&content_name=Aerospace&article=20605 (accessed July 18, 2013).

SFC Miller puts it, the people you eat and sleep with. The question is not just one of trust, but also of control, and at least from a doctrinal perspective, the two services are not that far apart in their understandings of control.

MISSION COMMAND, ORGANIC CONTROL, AND THE CENTRALIZED CONTROL AND DECENTRIALIZED EXECUTION OF AIRPOWER

The assertion expressed by the SNCO's at the Army's Aviation Center of Excellence, and by the World War I artillerymen is that organic control is a necessity for optimal air-ground coordination. The Air Force takes a somewhat different view that stresses flexibility. On June 21, 1943, the United States War Department published Field Manual (FM) 100-20, which served as the Army Air Forces primary doctrine document through the end of World War II.[95] The War Department published the opening of FM 100-20 in capital letters:

> THE INHERENT FLEXIBILITY OF AIR POWER, IS ITS GREATEST ASSET. THIS FLEXIBILITY MAKES IT POSSIBLE TO EMPLOY THE WHOLE WEIGHT OF THE AVAILABLE AIR POWER AGAINST SELECTED AREAS IN TURN; SUCH CONCENTRATED USE OF THE AIR STRIKING FORCE IS A BATTLE WINNING FACTOR OF THE FIRST IMPORTANCE. CONTROL OF AVAILABLE AIR POWER MUST BE CENTRALIZED AND COMMAND MUST BE EXERCISED THROUGH THE AIR FORCE COMMANDER IF THIS INHERENT FLEXIBILITY AND ABILITY TO DELIVER A DECISIVE BLOW ARE TO BE FULLY EXPLOITED. THEREFORE, THE COMMAND OF AIR AND GROUND FORCES IN A THEATER OF OPERATIONS WILL BE VESTED IN THE SUPERIOR COMMANDER CHARGED WITH THE ACTUAL CONDUCT OF OPERATIONS IN THE THEATER, WHO WILL EXERCISE COMMAND OF AIR FORCES THROUGH THE AIR FORCE COMMANDER AND COMMAND OF GROUND FORCES THROUGH THE GROUND FORCE COMMANDER.[96]

A key assertion was that "airpower must be centralized and command must be exercised through the Air Force commander" if the inherent flexibility of airpower is to be used to full advantage.

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[95] United States Army Air Force, *FM 100-20 Command and Employment of Air Power*, http://www.au.af.mil/au/awc/awcgate/documents/fm100-20_jul_1943.pdf (accessed May 16, 2013), 1.

[96] Ibid.

Current Air Force Doctrine Document (AFDD) 1 states, "the application of airpower is refined by several fundamental truths" that have been "proven over decades of experience" and cites "centralized control and decentralized execution of airpower" as critical to airpower's effective employment.[97]

The definitions listed in AFDD 1 are critical to understanding the Air Force's perspective on organic versus centralized control of airborne ISR assets, unmanned or manned. AFDD 1 defines centralized control and decentralized execution as follows:

> Centralized control is commanding airpower and should be accomplished by an Airman at the air component commander level who maintains a broad focus on the Joint Force Commander's (JFC) objectives to direct, integrate, prioritize, plan, coordinate, and assess the use of air, space, and cyberspace assets in any contingency across the range of operations.
>
> Decentralized execution is the delegation of authority to designated lower-level commanders and other tactical-level decision makers to achieve effective span of control and to foster disciplined initiative and tactical flexibility. It allows subordinates, all the way down to the tactical level, to exploit situational responsiveness and fleeting opportunities in rapidly changing, fluid situations.[98]

One example of Air Force centralized control/decentralized execution is the experience of the Army Air Force over the skies of France prior to the Normandy invasion. Ninth Air Force Historian Lieutenant Colonel Robert H. George wrote in 1945 that during the execution of aerial reconnaissance and interdiction sorties in support of the Transportation Plan, missions were "seldom aimed at specified targets."[99] He further adds that air planners designated Ninth Air Force missions as "armed reconnaissance" missions, and that flight leaders were "free to

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[97] United States Air Force, *AFDD 1*, http://static.e-publishing.af.mil/production/1/af_cv/publication/afdd1/afdd1.pdf (accessed June 25, 2013), 38.

[98] Ibid.

[99] Robert H. George, *Ninth Air Force: April to November 1944*,Army Air Force Historical Office, Headquarters Army Air Forces (October 1945): 143, http://cgsc.contentdm.oclc.org/utils/getfile/collection/p4013coll8/id/3302/filename/3312.pdf (accessed May 16, 2013).

determine the precise objectives of their bombing and strafing attacks."[100] Missions flown by 405th Fighter Group between 1510 and 2140 on July 28, 1943 provide one example:

> The 405th Group had been assigned to fly armed reconnaissance all day, but weather did not allow its planes to take off until afternoon. Then they proceeded to Villedieu, where they found few targets…as they widened the area of their search they discovered a mass of traffic moving south on the roads in the vicinity of Brehal, Gavray, and Percy. In places transport was moving bumper to bumper…the damage inflicted upon these enemy targets was enormous. In the case of one long column…the head and tail were attacked first so that the whole was immobilized allowing its elements to be systematically blasted…for more than six hours these attacks on transportation targets continued with a total of approximately 100 aircraft participating. In the midst of the melee a general radioed from a tank, "Go for it! Get one for me! The pilots asserted they had seen over 400 motor transports in flames plus 12 tanks and sundry other vehicles.[101]

This approach proved highly effective, and the success of the air interdiction campaign played a critical role in shaping the battlefield for the invasion.

The Air Force doctrinal concept of centralized control and decentralized execution is very similar to the Army's philosophy of mission command. Army and Air Force doctrine encourages that execution be left in the hands of subordinate commanders. However, Army and Air Force doctrine also recognizes that there are times when senior commanders require higher degrees of control. For example, AFDD 1 states that:

> Discipline demands that senior leaders resist the temptation to get involved with execution decisions that are normally best left to subordinate commanders and forward decision makers…the challenge is most apparent when a decision is made to re-role a sortie. At such time, the Joint Forces Air Component Commander (JFACC) is balancing campaign requirements against an unplanned need, such as prosecution of pop-up time-sensitive targets. In such cases, the JFACC and Air Operations Center (AOC) may have information not immediately available to the sortie leader.[102]

By comparison, U.S. Army mission command doctrine frames this challenge in terms of defining

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[100] Ibid.

[101] Ibid., 133.

[102] Ibid.

the appropriate level of control. ADP 6-0 *Mission Command* states:

> The appropriate degree of control varies with each situation and is not easy to determine. Different operations and phases of operations require tighter or more relaxed control over subordinate elements than other phases require…successful commanders understand that swift action may be necessary to capitalize on fleeting opportunities. They centralize or decentralize control of operations as needed to ensure that units can adapt to changing situations.[103]

Conceptually, the two services are relatively close on the issue of command and control. Each service prefers that commanders at lower echelons have the freedom to exercise disciplined initiative within the senior commander's intent during the execution of an operation. In a recently published paper in the *Air and Space Power Journal*, retired Air Force Lieutenant Colonel James Harvard refers to a "philosophical intersection" between the services and writes:

> The Army's principles of mission command—build cohesive teams through trust, create shared understanding, provide a clear commander's intent, exercise disciplined initiative, use mission orders, and accept prudent risk—are absolutely consistent with airpower doctrine.[104]

The Army defines "mission orders" within ADP 6-0 as:

> Directives that emphasize to subordinates the results to be attained, not how they are to achieve them. Commanders use mission orders to provide direction and guidance that focus the forces' activities on the achievement of the main objective, set priorities, allocate resources, and influence the situation.[105]

AFDD 1 does not use the term mission orders but the fundamental concept of using mission orders to convey commander intent is implicit within the Air Tasking Order (ATO). AFDD 6-0, *Command and Control* states, "the ATO is centrally planned and developed at the operational level, but its execution is decentralized to subordinate command and control nodes and tactical

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[103] ADRP 6-0, 2-15.

[104] James Harvard, "Airmen and Mission Command," *Air and Space Power Journal* (Mar-Apr 2013): 143, http://www.airpower.maxwell.af.mil/digital/pdf/articles/Mar-Apr-2013/F-Harvard.pdf (accessed: March 13, 2013).

[105] *ADP 6-0*, 5.

level units."[106] Further, AFDD 3-0 points out that commander's intent drives the air tasking cycle as defined by the Joint Operations Plan for Air (JOPPA).[107]

A common complaint among soldiers is that the ATO presents challenges to their own planning and execution efforts given the divergent timelines between their organic planning and the air tasking cycle. Joint Publication 3-30 states that while procedures and timelines may vary, "the ATO articulates the tasking for joint air operations for a specific timeframe, normally 24 hours" and that the full air tasking cycle "from JFC guidance to the start of ATO execution" takes 72 hours.[108] A *Joint Forces Quarterly* article co-written by then Lieutenant General Raymond Odierno described how early in the Iraq war the 72-hour ATO cycle posed a problem:

> Ground commanders could not plan operations around ISR availability; instead, they submitted requirements and then waited to find out if they would get echelons above division (EAD) coverage. At best, they would know 72 hours out if they had been allocated a Full Motion Video (FMV) asset; at worst, they would find their asset pulled at the last minute to support a higher priority corps requirement.[109]

General Odierno and his coauthors go on to assert that "the counter-insurgency environment's decentralized nature makes it imperative that ISR asset control, from tactical through theater level, be pushed to the lowest possible echelon" as doing so enables commanders to seize the

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[106] United States Air Force, *Air Force Doctrine Document 6-0: Command and Control*, http://static.e-publishing.af.mil/production/1/af_cv/publication/afdd6-0/afdd6-0.pdf (accessed June 24, 2013), 13.

[107] United States Air Force, *AFDD 3-0: Operations and Planning*, http://static.e-publishing.af.mil/production/1/af_cv/publication/afdd3-0/afdd3-0.pdf, (accessed September 3, 2013), 82.

[108] United Stated Department of Defense. *Joint Publication 3-30: Command and Control for Joint Air Operations*. http://www.dtic.mil/doctrine/new_pubs/jp3_30.pdf (accessed June 24, 2013), xx.

[109] Raymond T. Odierno, Nichoel E. Brooks, and Francesco P. Mastracchio, "ISR Evolution in the Iraqi Theater," *Joint Force Quarterly, no. 50* (3rd Quarter 2008): 53, http://www.dami.army.pentagon.mil/site/dig/documents/ISR-Evolution-N-Iraqi-Theater-Odierno-JFQ-2008.pdf (accessed June 23, 2013).

initiative and "take advantage of fleeting opportunities."[110]

That said, with enough coordination and joint planning, centralized theater control and decentralized execution can approach the level of support afforded by organic control. Colonel Jason Brown, a former Air Force ISR squadron commander whose primary mission was providing airborne sensors production, exploitation, and dissemination for Operation ENDURING FREEDOM, offers a different narrative than General Odierno and the Army Aviation Center SNCOs. He writes:

> *Imagine a situation commonplace in the mountains of Afghanistan. Taliban insurgents prepare to ambush an allied military convoy in Helmand Province. They coordinate a scheme of maneuver, attack sequence, and withdrawal between elements scattered in the hills above the convoy's chosen road. Thousands of miles away, in a 4,000-square-foot room packed with screens showing imagery, maps, telemetry, and video feeds, a signals intelligence (SIGINT) analyst in the 13th Intelligence Squadron recognizes the impending ambush. She quickly presses a button attached to her headset and speaks to a U-2 pilot half a world away: "Bat zero-six, this is GMS (Ground Mission Supervisor) with an update for Widow zero-two." Details on the enemy ambush quickly follow, and the pilot switches over to the frequency monitored by Widow 02, a joint tactical air controller assigned to the convoy, to pass the intelligence to him…*
>
> *The ISR mission commander (develops) a plan to refine the coordinates of the potential ambushers. He turns to the leader of the analytical and reporting section, directing him to fuse the latest intelligence reporting in the area with historical SIGINT and imagery gathered within the unit and at other locations. The ISR mission commander develops a plan with another mission commander for two unmanned aircraft systems in the area, an RQ-4 Global Hawk and an MQ-1 Predator, to cross-cue intelligence from the U-2. Finally, he directs his crew to coordinate everything with their intelligence counterparts, the battalion S2 personnel in Widow's tactical operations center. Moments later, an Airman first class and a private first class, separated by 12 time zones, exchange what they know about the potential ambush in real time through a classified computer chat program, and a wave of intelligence about the enemy's location begins to arrive at Widow's tactical operations center. Within minutes, the Taliban hunters become the hunted.*
>
> …Every day, intelligence professionals conduct combat operations like this one. They execute ISR operations that provide threat warning to patrolling soldiers and marines, find potential locations of improvised explosive devices along convoy routes, and track

[110] Ibid., 52.

insurgents for targeting purposes.[111]

In Colonel Brown's example, a classified computer chat program serves as the foundation for powerful joint warfighting capability. Chat programs provide a venue where operators establish working relationships. Trust and understanding develops from those relationships, which enables the mission command philosophy to enhance theater airborne ISR operations. Implicit in Colonel Brown's example is the importance of well-trained operators and the necessity of planning in joint integration. That the GMS and the U-2 pilot knew how to support Widow zero-two is indicative of both. However, by viewing the challenges associated with integrating theater-controlled airborne ISR with ground forces as a design problem, constraints appear that may offer a better understanding of the friction within the system.

Once again, Lawson's model provides a structure for identifying the sources and types of constraints for Air Force ISR planners and operators. The military service departments at the Pentagon may impose, either directly or indirectly, rigid constraints that range from the radical to symbolic. The question of organic- versus theater-controlled airborne ISR, viewed in the context of recent operations in Iraq and Afghanistan, has had some important implications for the defense budget. All four of the services have made airborne ISR a budget priority, with much of that money focused one way or another on unmanned aerial sensors. The director of the Army's aviation directorate, Colonel Pat Tierney, seems to sense Congressional pressure mounting against United States Army UAS capabilities amidst a backdrop of emerging fiscal austerity.[112]

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[111] Jason Brown, "Operating the Distributed Common Ground System: A Look at the Human Factor in Net-Centric Operations," *Air and Space Power Journal* (Winter 2009): http://www.airpower.maxwell.af.mil/airchronicles/apj/apj09/win09/brown.html (accessed February 14, 2013).

[112] Stew Magnuson, "Budget Cuts Reignite Army, Air Force UAV Turf Battle," *National Defense Magazine,* (December 11, 2012): http://www.nationaldefensemagazine.org/blog/lists/posts/post.aspx?ID=994 (accessed June 22, 2013).

According to a press account of a presentation he delivered at a December 2012 Army Aviation Association of American Unmanned Aircraft Systems conference, Tierney indicated that:

> The Air Force is flying its Reapers and Predators on "strategic" missions and must share its aircraft across all four services. The Army needs its Gray Eagles and other large Unmanned Aerial Vehicles (UAVs) for tactical missions. “The Air Force would come to us and say 'we can probably cover most of those missions with what we've got. There is duplicity there.' I am telling you that is just not true" Tierney said. The Army has moved away from using UAVs for intelligence, surveillance and reconnaissance as the Air Force still does. It is using them for reconnaissance, surveillance and target acquisition, he said. The target acquisition mission must remain in the Army at the division level, he said. If a target is in sight, officers can't wait hours for an Air Force Reaper, which may already be tasked on another mission, to show up. "There are certain things we have got to be able to do for ourselves.”[113]

Tierney’s remarks as portrayed in the press account are somewhat curious given that Air Force Predators and Reapers have found, fixed, and finished hundreds of “tactical” targets. That said, these remarks are indicative of friction from symbolic and formal constraints with a conceptual basis that goes back to the experiences of the artillerymen in World War I.

To an extent, political leaders have demonstrated some awareness for the necessity to better integrate ISR efforts. The Congressional interest that Tierney alluded to often revolves around the issue of commonality. A United States Government Accountability Office (GAO) Report to the U.S. House of Representatives Armed Services Subcommittee on Air and Land Forces found that the Air Force and the Army had missed opportunities to find savings through commonality in their airborne ISR systems.[114] The report stated:

> For the unmanned aircraft systems we reviewed, the services established requirements that were often so specific that they demanded service unique solutions—thereby

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[113] Ibid. Note: The terms UAV and UAS are often used interchangeably.

[114] United States Government Accountability Office, *Defense Acquisitions: Opportunities Exist toAchieve Greater Commonality and Efficiencies among Unmanned Aircraft System*, GAO-09-520, July 2009, http://www.gao.gov/assets/300/293221.pdf (accessed June 19, 2013), 16.

> precluding opportunities for commonality. Yet none of the programs were able to provide us quantitative analyses to justify pursuing their unique solutions or to show why common solutions would not work.[115]

The Army has plans to equip each of its 10-15,000 soldier divisions with a Gray Eagle company of twelve aircraft.[116] The Gray Eagle is very similar in appearance to the Air Force Predator, but there are some important differences in terms of weapons capability, communications relay capability, and method of flying as the Gray Eagle is based on "point and click" flying as opposed to the Air Force's preferred "stick and rudder" methods.[117]

Soldiers at the division level will undoubtedly be expected to employ the Gray Eagle ISR platforms the Army is buying at significant expense. Fully tasking the organic Gray Eagles prior to leveraging the air component for additional support, even if the air component can provide sensors with more firepower, may become a symbolic constraint in and of itself given the Army's investment. Further, those aircraft will need airspace, which means the Air Operations Center will have to ensure deconfliction in what is becoming an increasingly crowded sky. These factors combine to present a unique blend of friction derived from symbolic, practical, and formal constraints. Thus, mission command's requirement that each side strive for shared understanding and trust becomes even more critical, otherwise an opportunity to create synergy from the capabilities of both might be missed.

CONCLUSION: AIRBORNE ISR AND MISSION COMMAND

According to an April 2013 Stimson Center interview with Lt Gen. Larry James, the Deputy Air Force Chief of Staff for Intelligence, Surveillance, and Reconnaissance, the Air Force

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[115] Ibid., 19.

[116] Kris Osborn, Army Expanding, Upgrading Gray Eagle Fleet http://www.army.mil/article/82790 (accessed June 25, 2013).

[117] *GAO-09-520*, 20.

currently employs sixty MQ-9 capable Reaper Combat Air Patrols (CAP), and will reach sixty-five CAPs by 2014.[118] An MQ-9 CAP is comprised of two launch and recovery elements, four aircraft, and the crews that fly the aircraft and process, exploit, and disseminate the intelligence it collects.[119] A single Reaper can carry up to sixteen AGM-114 Hellfire missiles, which is as many an Army Apache helicopter, or a mix of missiles and 500-pound precision guided bombs.[120] Given that much sensor capability and firepower, and the size of the battlespace an Army division might be responsible for, there is clear incentive to overcome the friction that might limit the effectiveness of Air Force ISR assets.

An emerging trend in Air Force ISR operations suggests a mission command-oriented middle ground between Army organic control and Air Force theater control of airborne ISR assets. In a recent *Air and Space Power Journal* article, Captain Jaylan Michael Haley, an experienced AF ISR mission commander, posits that Air Force ISR operators have developed airborne ISR Mission Type Orders (MTO) to "overcome impractical and constrictive tasking procedures rooted in doctrine and inflexible theater guidelines."[121] Haley describes how the land component prioritizes intelligence requirements at different echelons of command and then pushes them to the Air Operations Center if organic capabilities are unable to fulfill those

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[118] Lt. Gen. Larry D. James, interviewed by Rachel Stohl, Brookings Institute, April 24, 2013. http://www.stimson.org/events/the-us-air-force-and-drone-policy/ (accessed June 23, 2013).

[119] Sharon Weinberger, *Air Force Drone Patrols Reach New High* (Nov 5, 2010): http://www.aolnews.com/2010/11/05/air-force-drone-patrols-reach-new-high/ (accessed June 23, 2013).

[120] Ibid., 35.

[121] Jaylan Michael Haley, "An Evolution in Intelligence Doctrine," *Air and Space Power Journal* (Sept-Oct 2012): 34, http://www.airpower.au.af.mil/digital/pdf/articles/Sep-Oct-2012/F-Haley.pdf, (accessed February 14, 2013).

requirements, stating that for Operation Enduring Freedom 80% of the intelligence requirements at the Air Operations Center originated from the ground forces at lower echelons.[122] Haley echoes General Odierno in highlighting that the normal 72-hour ATO cycle within the traditional ISR tasking process levies inflexible and difficult requirement on tactical echelons.[123]

A 2007 Naval War College paper written by Lieutenant Colonel Michael Downs describes the traditional ISR tasking methodology. He writes that under the traditional system a "collection manager in the AOC will gather all of the ISR target requests from [Afghanistan], rank them according to theater priorities, and then draw a 'cut line' above which, the targets will be imaged."[124] That collection deck has to be built off requirements that are generated days prior to execution. According to Lieutenant Colonel Downs, this imposing formal constraint is impractical and discourages lower echelon units from submitting requirements for theater airborne reconnaissance assets.[125] Hayley describes the difference between the traditional process and ISR MTO, asserting that ISR MTO:

> deal with "just-in-time" ISR operations rather than collection requirements generated days before operations begin—requirements that have soured before anyone can use the intelligence. ISR MTOs avoid attempts to predict both friendly and enemy operations days in advance (virtually impossible in dynamic situations) by ensuring collection at the right time and in pursuit of relevant needs without burdensome procedures.[126]

Hayley concludes that airborne ISR MTO need to find their way into joint doctrine along with the

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[122] Ibid, 36.

[123] Ibid., 37.

[124] Michael L. Downs, *Rethinking the CFACC's Intelligence, Surevillance, and Reconnaissance Approach to Counterinsurgency*, (October 5, 2007): 11, http://www.dtic.mil/dtic/tr/fulltext/u2/a470834.pdf (accessed September 30, 2013).

[125] Ibid.

[126] Hayley, 38.

traditional ISR tasking methods, given the inherent flexibility they afford to both airborne ISR operators and consumers.[127] This would overcome the perceived rigid practical constraints imposed by the air tasking cycle. Airborne ISR MTO may prove to be a viable middle ground in the organic versus centralized control debate.

The Air Force ISR MTO concept highlights the similarities between the Air Force's doctrinal views of centralized control/decentralized execution and the Army's philosophy of mission command. However, no matter how effective ISR MTO might prove to be in addressing asset availability and timeliness, there remains the question of integration. How do airmen and soldiers that are working twelve time zones apart better integrate? The active communication via classified chat programs described by Colonel Brown is part of the solution. Further, General Odierno sees great benefit in having Air Force ISR liaison officers at the division level and lower.[128] Yet, as operations draw down in Afghanistan, the liaisons and the soldiers they support will start to come home, and as the classified computer chat rooms grow quiet, the focus must shift to integrated joint training in order to continually build and maintain trust.

Moltke's challenge to his cavalry for accurate reconnaissance resonates for ISR operators across time and through every warfighting domain. He writes:

> It is a question of coming quickly to a point that allows a broad view, using rapid judgment, many times in flight, to survey the recognizable details of the enemy situation, the state of his bivouac, the strength and direction of his march and so forth, and then immediately sending clear, complete, and above all, reliable reports.[129]

Mutual understanding supports clear, complete, reliable reports. Reliability forms the requisite foundation for trust between consumers and airborne ISR operators. In a white paper on mission

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[127] Ibid.

[128] Odierno, Brooks, and Mastracchio, 55.

[129] Moltke, 196.

command, General Dempsey, Chairman of the Joint Chiefs of Staff, writes that future "operations will move at the speed of trust."[130] Training facilitates trust and reliable reporting, and mitigates against constraints and resulting friction. Unfortunately, a study published by the United States Government Accountability Office in March 2010 found:

> Air Force UAS personnel and Army ground units have limited opportunities to train together in a joint environment, and they have not maximized the use of available assets during training. Current UAS simulators also have limited capabilities to enhance training. DOD has commenced initiatives to address training challenges, but it has not developed a results-oriented strategy to prioritize and synchronize these efforts.[131]

The Department of Defense is working to address these issues, particularly that last point about not having a results-oriented strategy. In response to a mandate from Congress in the FY 2011 National Defense Authorization Act, in April 2012 the Department of Defense released the *Report to Congress on Future Unmanned Aircraft Systems, Training, Operations, and Sustainability*. According to this report, the Department of Defense:

> is developing a comprehensive DOD UAS training strategy. The strategy will leverage the skills and expertise of each organization and build on foundational efforts already completed or being studied within the Military Departments. The study will investigate and assess the adequacy of existing and forecast joint, Military Department, and Combatant Commander UAS plans and programs that identify and describe qualification, continuation, and joint training requirements and concept of operations (CONOPS). The strategy will identify and describe individual, unit, and large force training requirements of all groups of UAS. The result will be a UAS Training Roadmap that guides UAS training shortfall and mitigation analyses, provides UAS training recommendations, and proposes investment considerations for the UAS community.[132]

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[130] Dempsey, Martine E. Mission Command White Paper, (3 April 2012): http://www.jcs.mil/content/files/2012-04/042312114128_CJCS_Mission_Command_White_Paper_2012_a.pdf (accessed April 16, 2013).

[131] United States Government Accountability Office, *Unmanned Aircraft Systems: Comprehensive Planning and a Results-Oriented Training Strategy Are Needed to Support Growing Inventories*, GAO 10-331, (March 2010): http://www.gao.gov/assets/310/302249.pdf (accessed: June 23, 2013).

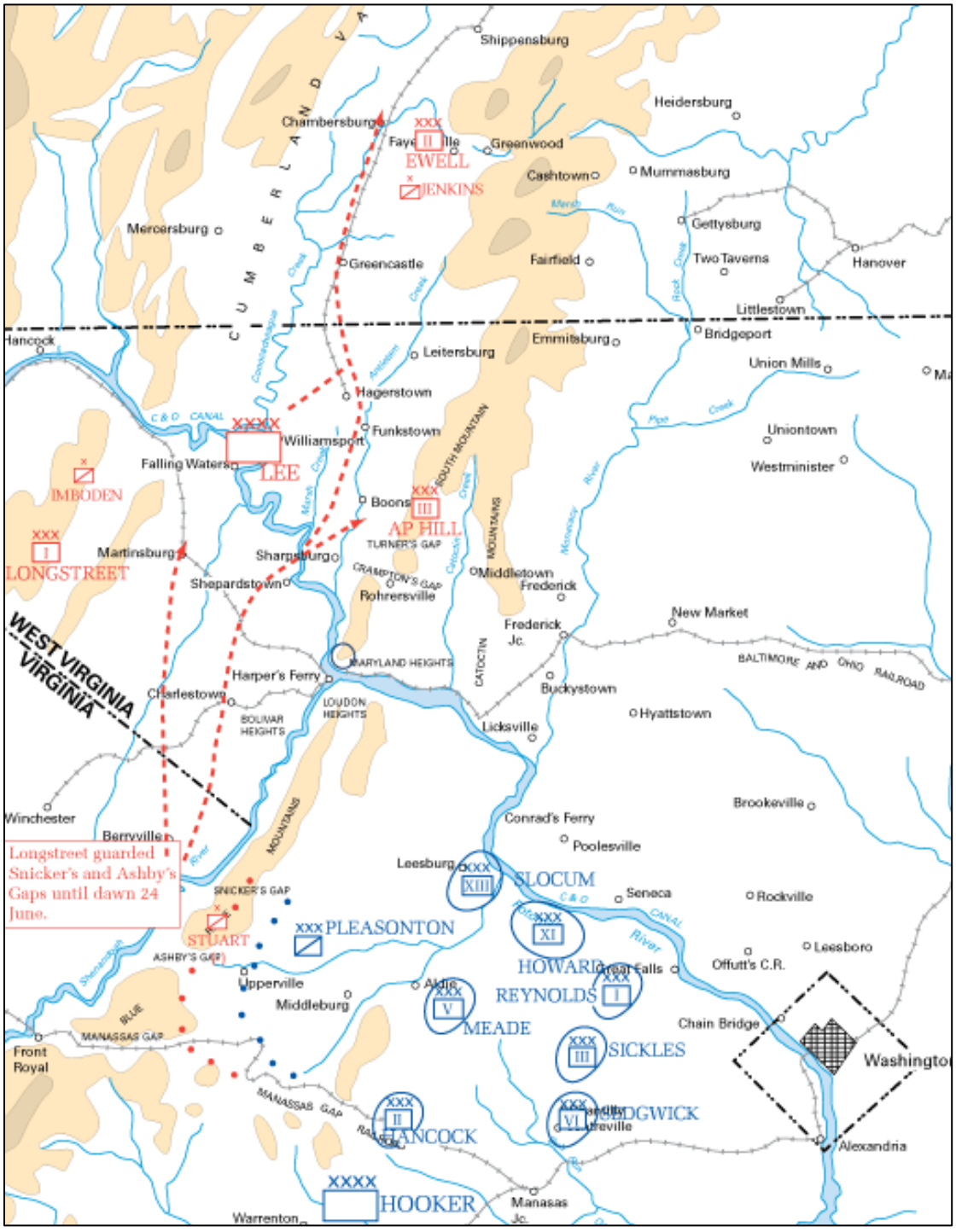
[132] United States Department of Defense, *Report to Congress on Future Unmanned Aircraft Systems, Training, Operations, and Sustainability*, https://www.fas.org/irp/program/collect/uas-future.pdf (accessed June 23, 2012), 25.

The report represents an important opportunity. As operations wind down in Afghanistan and as the Army purchases additional organic unmanned aircraft systems, there is risk that the services will drift further apart. The wartime experience has been one of coordination via classified Internet chat programs and video teleconferences. However, what will replace the forcing function of war for young soldiers and airmen? The answer should be training.

The mission command philosophy alone is not a panacea to the friction present in integrating theater airborne ISR assets with ground forces. Airmen must understand that soldiers have long expressed a preference toward some level of organic UAS ISR capability that it controls to collect. The importance of having some airborne ISR assets under their organic control is a view that soldiers have espoused since World War I. Still, the Army should consider mission command, with its implicit trust and shared understanding, as a means to leverage the sensor capability and firepower that sixty-five global Air Force CAPs presents. The Air Force should consider further refinements to ISR MTO processes that nest with a ground commander's clearly articulated statement of intent.

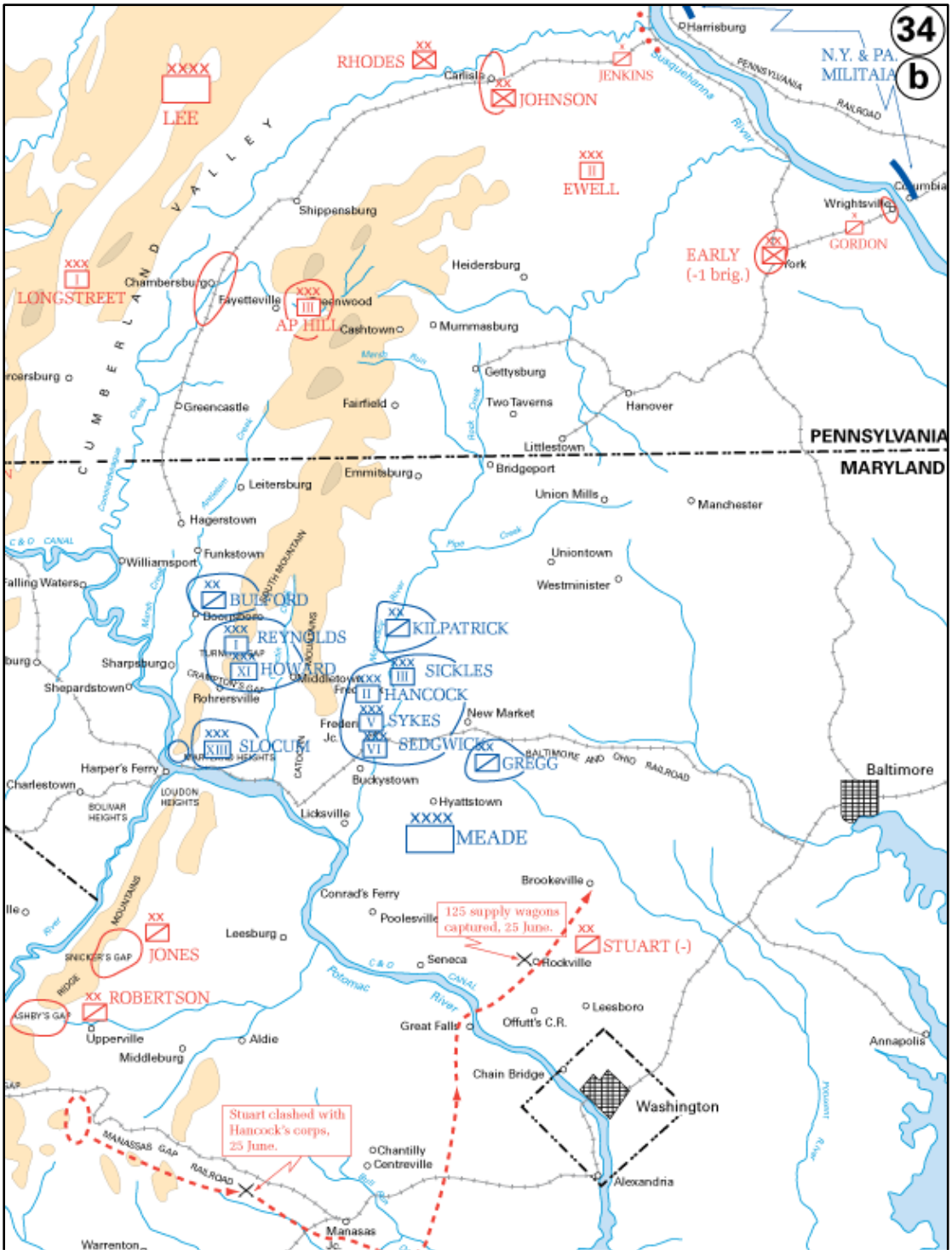
The airborne ISR MTO technique was developed to meet the requirements of the counter-insurgency fights in Iraq and Afghanistan. ISR MTO should also work in a fast-moving conventional fight. Joint training must be enhanced and made routine. Perhaps enhanced training and additional exercises between aligned Brigade Combat Teams and Air Force active duty and reserve ISR units would strengthen the foundations necessary for enhanced mutual understanding and trust. If the two sides grow further apart during peacetime, friction will become more pronounced, and ISR planning and execution will suffer at the start of the next major conflict.

APPENDIX A: THE CONFEDERATE PUSH NORTH – JUNE 19-24, 1863.



Source: U.S. Military Academy Department of History, The Gettysburg Campaign: Map 34a, http://www.westpoint.edu/history/SiteAssets/SitePages/American%20Civil%20War/ACW34a.gif (accessed October 15, 2013).

APPENDIX B: STUART'S MOVEMENTS JUNE 25-28, 1863.



Source: U.S. Military Academy Department of History, The Gettysburg Campaign: Map 34b. http://www.westpoint.edu/history/SiteAssets/SitePages/American%20Civil%20War/ACW34b.gif (accessed October 15, 2013).

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